



Molecular and Cellular Bioscience Approaches for Exploring the Rules of Life

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DIVISION OF MOLECULAR & CELLULAR BIOSCIENCES

**Biology Advisory Committee
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**Experimental/Theoretical Framework
(How Things Happen.)**

Synthetic Biology

Embracing the Rules of Life

*“That which I can’t build, I don’t understand”
R. Feynman*

**Evolutionary-Life History
(What Has Happened?)**

**Engineering Derived Traits
(What can Happen?)**

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Predictive Biology through Interdisciplinary Research





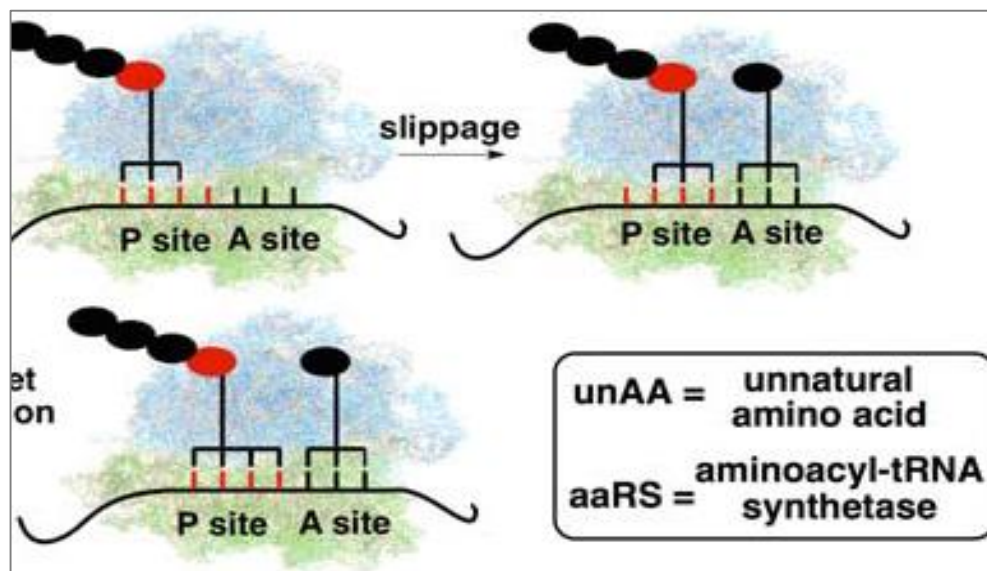
Engineering Derived Traits (What Can Happen?)

MCB 1553041 (SSB)

Jianto Guo, University of Nebraska-Lincoln –

CAREER: *Quadruplet codon decoding mechanistic studies and Application - Cellular Genetic Code Expansion*

Objective: Build a quadruplet codon system

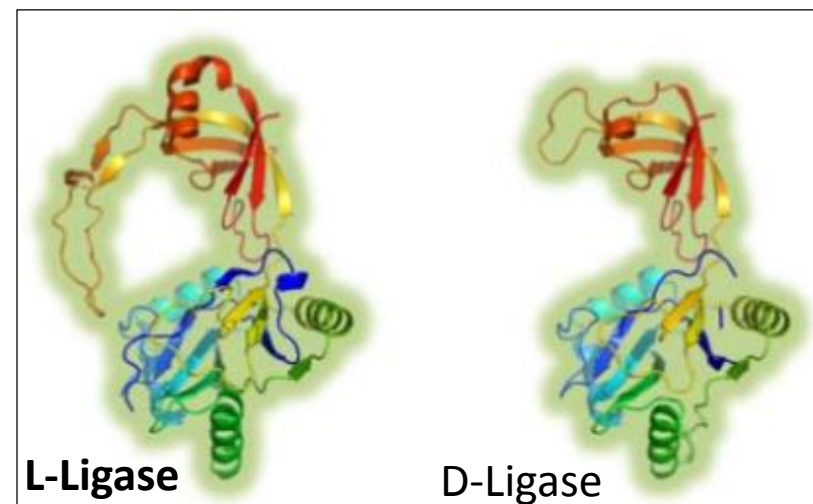


MCB 1443228 (SSB)

Dawson Philip, Scripps Research Institute

– *ERASynBio: Establishment of a Fully Synthetic, Mirror-Image Biological System*

Objective: Build a functional cell composed of mirror image components; e.g. enantiomeric L-nucleotides and D-amino acids



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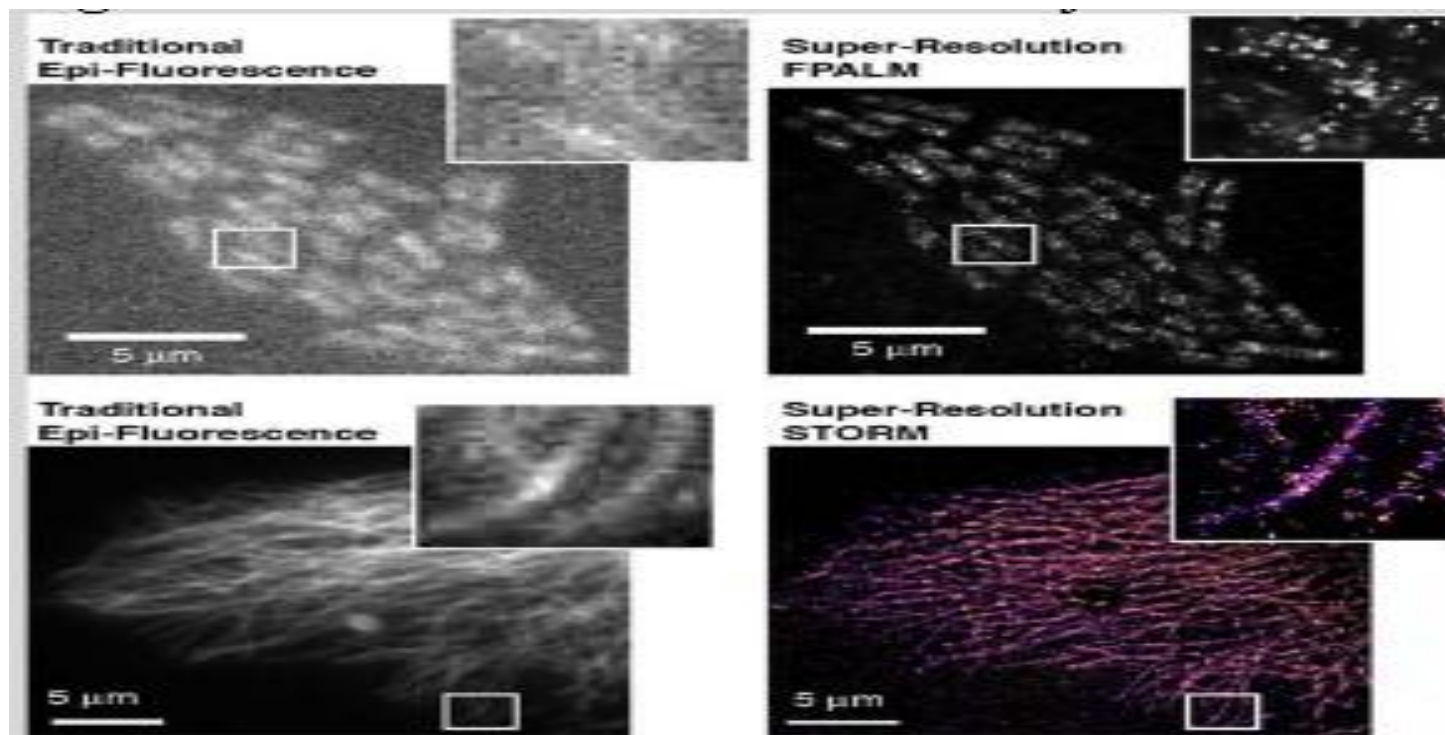
Theoretical Framework

(How do things happen?)

MCB 1344203 (CDF)

Jennifer Ross, University of Massachusetts-Amherst INSPIRE Track 1:
Condensed Phases and Transitions of Cellular Patterns

–Objective: Apply soft matter physics principles to understand biological self-organization



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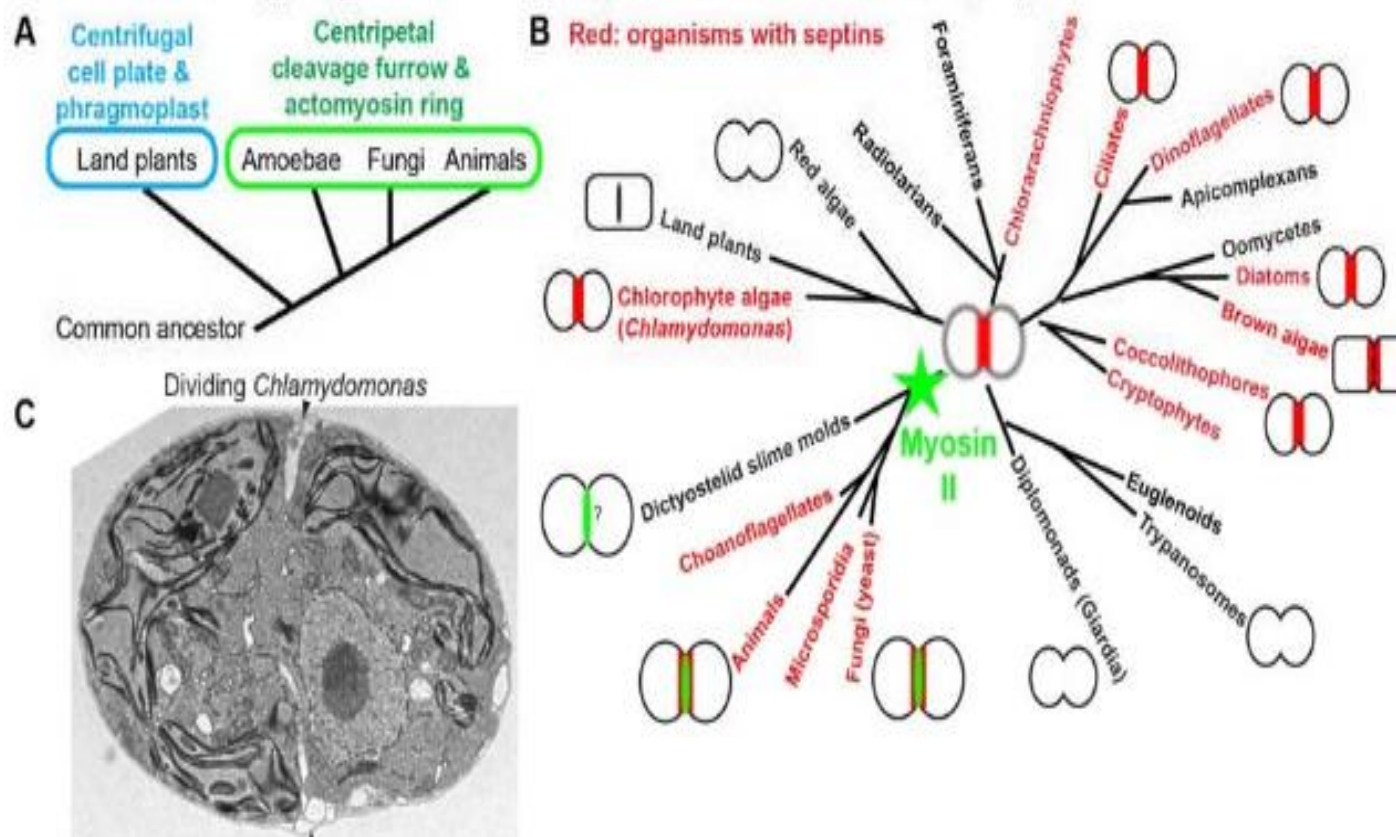
Evolutionary Life History

(What has Happened?)

MCB 1548533 (CDF)

John Pringle, Stanford University. **EAGER-Cytokinesis mechanisms and cytoskeletal dynamics in *Chlamydomonas***

Objective: Discover ancestral cytokinetic states in extant cells.



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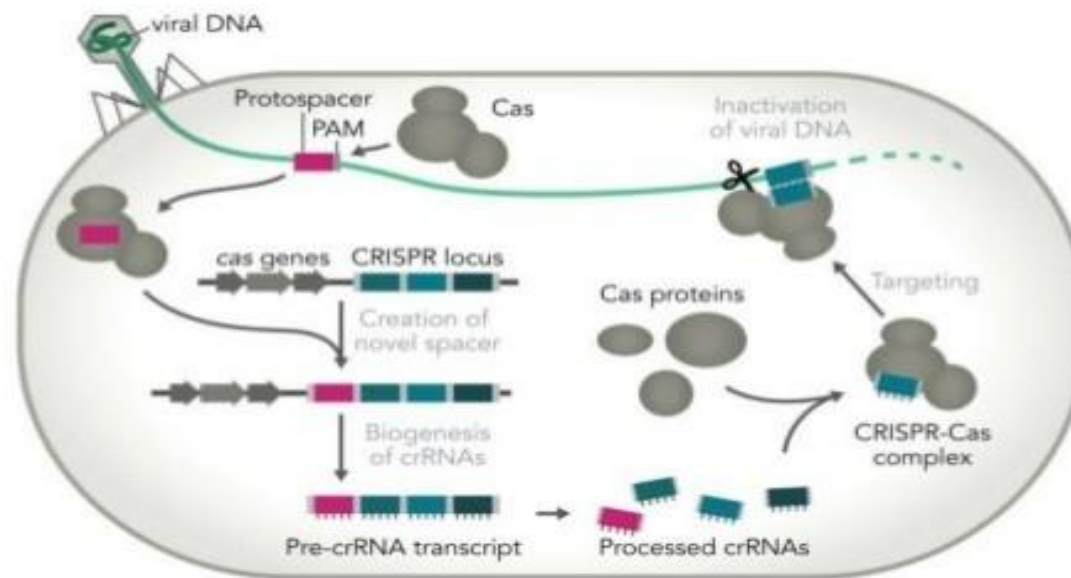




MCB 1550226 (SSB)

Jennifer Doudna, University of California-Berkeley Mechanism of Acquired Immunity in Bacteria

Objective: Engineer phage-resistant bacteria using **CRISPR** technology



SynBio will benefit immensely from the CRISPR technology that was supported by MCB from the beginning

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